

Application No.: 09/522,709

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**AMENDMENTS TO THE CLAIMS:**

*Please amend the claims as follows:*

1. (Currently amended) A computerized method for managing risk in a market related to electricity delivered over a network comprised of tradable network locations, comprising the steps of:

(1) a computer modeling locational prices of electricity in the market as a linear combination of congestion prices for a plurality of congestible transmission lines in the network, wherein said step of modeling locational prices comprises:

determining a set of distribution factors representing the physics of the flow of electricity in the network,

determining a plurality of values representing the prices of congestion for the congestible transmission lines at a prospective time, and

determining a pattern of spot locational prices in the network at the prospective time, wherein said pattern of spot locational prices is a function of said set of distribution factors and said plurality of values representing the prices of congestion for the congestible lines;

(2) a computer creating a portfolio of future positions which includes:

selecting a portfolio of price risk instruments which represent distribution factors describing the physics of the flow of electricity in the network and the available market of price instruments; and

Application No.: 09/522,709

(3) a computer producing a combination of price risk instruments for the market in which  
an underlying position in the market is determined from:

(a) the spot locational prices determined in step (1), and

(b) the portfolio of future positions created in step (2), such that the difference  
between the underlying position in the market with respect to the distribution factors and the  
portfolio of future positions with respect to the distribution factors is calculated such that at least  
one amount of each of the price risk instruments are proportioned, thereby interlocking to cause  
[[the]] eventual locational prices to be interleaved such that and reducing an effect of the  
congestion prices for the plurality of congestible transmission lines on the locational prices of the  
electricity is reduced.

2. (Previously presented) The method according to claim 1, wherein the step of  
producing the combination of price risk instruments further includes the steps of:

creating a table of congestion events with respect to the tradable network locations;

populating the table with values for the relative impact on the locational price of each  
congestion event;

creating from the table a portfolio of future positions;

assessing the risk of each of the future positions in the portfolio of future positions by  
assessing the number of congestion events that would result in a loss for the portfolio; and

determining from the assessment of risk which portfolio would result in the lowest risk.

3. (Previously presented) The method according to claim 2, wherein the step of  
creating a portfolio of future positions includes selecting a portfolio y of price risk instruments,  
such that:

Application No.: 09/522,709

$$\mathbf{z}'\mathbf{A} - \mathbf{y}'\mathbf{P}'\mathbf{A} = 0,$$

where **A** represents distribution factors describing the physics of power flows in the network, **P** represents the available market of price instruments, and **z** represents a market participant's underlying position in the market at the prospective time **T**, and wherein the portfolio includes a set of positions and primes denote transpositions.

4. (Cancelled)

5. (Withdrawn) A method of using a computer for evaluating a portfolio of price risk instruments in a market related to a commodity delivered over a network, comprising the steps of:

using a computer for estimating a plurality of distribution factors indicating effects on one or more congestible lines in the network due to transfers of the commodity at respective locations in the network; and

using a computer for evaluating the portfolio based on the estimated distribution factors.

6. (Withdrawn) The method of claim 5, wherein the step of evaluating the portfolio includes the step of calculating a cost  $f$  based on the formula  $f = (\mathbf{z}'\mathbf{A} - \mathbf{y}'\mathbf{P}'\mathbf{A})\lambda + \mathbf{y}'\mathbf{F}$ , wherein:

**y** represents the portfolio of price risk instruments;

**z** represents underlying positions in the market at the prospective time;

**P** represents a market of available price risk instruments;

**F** represents prices for the available price risk instruments;

**A** represents the distribution factors;

$\lambda$  represents prices of congestion for the congestible lines; and

**Application No.: 09/522,709**

primes denote transpositions.

7. (Withdrawn) A method of using a computer for hedging a set of underlying positions at a prospective time in a market related to a commodity delivered over a network, comprising the steps of:

using a computer for estimating a plurality of distribution factors indicating effects on one or more congestible lines in the network due to transfers of the commodity at respective locations in the network; and

using a computer for producing a portfolio of price risk instruments for the market based on the estimated distribution factors.

8. (Withdrawn) The method for hedging according to claim 7, wherein the step of producing the portfolio includes the step of eliminating an effect of congestion prices for congestible lines on prices of the commodity at respective locations in the network.

9. (Withdrawn) The method according to claim 7, wherein the step of producing the portfolio includes selecting a portfolio  $y$  of price risk instruments, such that  $z' \mathbf{A} - y' \mathbf{P}' \mathbf{A} = 0$ , where  $\mathbf{A}$  represents the distribution factors,  $\mathbf{P}$  represents the available market of price instruments, and  $z$  represents the underlying position and primes denote transpositions.

10. (Canceled)

11. (Withdrawn) A method of using a computer for identifying arbitrage opportunities among a plurality of available price risk instruments in a market related to a commodity delivered over a network, comprising the step of:

**Application No.: 09/522,709**

using a computer for estimating a plurality of distribution factors indicating effects on one or more congestible lines in the network due to transfers of the commodity at respective locations in the network; and

using a computer for producing a portfolio of price risk instruments from among the available price risk instruments based on the estimated distribution factors, wherein a number of the price risk instruments is greater than a number of the one or more congestible lines.

12. (Withdrawn) The method according to claim 11, wherein the step of producing the portfolio includes selecting a portfolio  $y$  of price risk instruments, such that  $y'P'A = 0$ , where  $A$  represents the distribution factors, and  $P$  represents the available market of price instruments and primes denote transpositions.

13. (Cancelled)

14. (Withdrawn) A method of identifying arbitrage opportunities among a plurality of available price risk instruments in a market related to a commodity delivered over a network using a computer, comprising the step of:

using a computer for modeling locational prices of the commodity in the market as a linear combination of congestion prices for congestible lines in the network; and

using a computer for producing a portfolio of price risk instruments from among the available price risk instruments in a proportion such that an effect of the congestion prices for the congestible lines on the locational prices of the commodity is eliminated, wherein a number of the price risk instruments is greater than a number of the one or more congestible lines.

15. (Withdrawn) The method according to claim 14, wherein the step of producing the portfolio includes selecting a portfolio  $y$  of price risk instruments, such that  $y'P'A = 0$ , where

**Application No.: 09/522,709**

A represents the linear combination, and P represents the available market of price instruments and primes denote transpositions.

16. (Cancelled)

17. (Currently amended) A computer-readable medium bearing instructions for managing risk in a market related to electricity delivered over a network, said instructions being arranged to cause one or more processors upon execution thereby to perform the steps of:

(1) modeling locational prices of the electricity in the market as a linear combination of congestion prices for congestible lines in the network, wherein said step of modeling locational prices comprises:

determining a set of distribution factors representing the physics of the flow of electricity in the network,

determining a plurality of values representing the prices of congestion for the congestible transmission lines at a prospective time, and

determining a pattern of spot locational prices in the network at the prospective time, wherein said pattern of spot locational prices is a function of said set of distribution factors and said plurality of values representing the prices of congestion for the congestible lines;

(2) a computer creating a portfolio of future positions which includes:

selecting a portfolio of price risk instruments which represent distribution factors describing the physics of the flow of electricity in the network and the available market of price instruments; and

**Application No.: 09/522,709**

(3) a computer producing a combination of price risk instruments for the market in which  
an underlying position in the market is determined from:

(a) the spot locational prices determined in step (1), and

(b) the portfolio of future positions created in step (2), such that the difference  
between the underlying position in the market with respect to the distribution factors and the  
portfolio of future positions with respect to the distribution factors is calculated such that at least  
one amount of each of the price risk instruments are proportioned, thereby interlocking to cause  
[[the]] eventual locational prices to be interlocked such that and reducing an effect of the  
congestion prices for the plurality of congestible transmission lines on the locational prices of the  
electricity is reduced.

18. (Withdrawn) A computer-readable medium bearing instructions for evaluating a portfolio of price risk instruments in a market related to a commodity delivered over a network, said instructions being arranged to cause one or more processors upon execution thereby to perform the steps of:

estimating a plurality of distribution factors indicating effects on one or more congestible lines in the network due to transfers of the commodity at respective locations in the network; and  
evaluating the portfolio based on the estimated distribution factors.

19. (Currently amended) A portfolio generating system and portfolio comprising:  
a computer-based system configured to generate a portfolio having a plurality of price risk instruments by carrying out the following steps:

Application No.: 09/522,709

(1) modeling locational prices of electricity in the market as a linear combination of congestion prices for a plurality of congestible transmission lines in the network, wherein said step of modeling locational prices comprises:

determining a set of distribution factors representing the physics of the flow of electricity in the network,

determining a plurality of values representing the prices of congestion for the congestible transmission lines at a prospective time, and

determining a pattern of spot locational prices in the network at the prospective time, wherein said pattern of spot locational prices is a function of said set of distribution factors and said plurality of values representing the prices of congestion for the congestible lines;

(2) a computer creating a portfolio of future positions which includes:

selecting a portfolio of price risk instruments which represent distribution factors describing the physics of the flow of electricity in the network and the available market of price instruments; and

(3) a computer producing a combination of price risk instruments for the market in which an underlying position in the market is determined from:

(a) the spot locational prices determined in step (1), and

(b) the portfolio of future positions created in step (2), such that the difference between the underlying position in the market with respect to the distribution factors and the portfolio of future positions with respect to the distribution factors is calculated such that at least one amount of each of the price risk instruments are proportioned, thereby interlocking to cause

**Application No.: 09/522,709**

[[thc]] eventual locational prices to be interlocked such that and reducing an effect of the congestion prices for the plurality of congestible transmission lines on the locational prices of the electricity is reduced;

the portfolio comprising:

the plurality of price risk instruments for a market related to electricity delivered over a network,

wherein the price risk instruments  $y$  are proportioned such that  $z'A - y'P'A = 0$ ,

$A$  represents distribution factors describing the physics of power flows in the network,

$P$  represents the available market of price instruments,

$z$  represents a market participant's underlying position in the market at a prospective time  $T$ , and

primes denote transpositions,

wherein said computer-based system comprises:

a communication mechanism for communicating information;

a processor coupled to the communication mechanism for processing information;

a dynamic storage device coupled to the communication mechanism for storing information and instructions; and

a static storage device coupled to the communication mechanism for storing static information and instructions.

20. (Previously presented) The portfolio generating system of claim 19, wherein a number of the price risk instruments is greater than a number of the at least one congestible lines.

**Application No.: 09/522,709**

21. (Previously presented) The method according to claim 1, wherein:

the step of determining a set of distribution factors representing the physics of the flow of electricity in the network further comprises: determining a matrix  $A$  of distribution factors describing the physics of electricity flows in the network, wherein said matrix  $A$  contains a column representing the effect of transmission losses on transfers of electricity and a column for each of the congestible transmission lines representing the percentage of an incremental flow of electricity that results from the transfer of electricity between a reference location and each tradable network location;

the step of determining a plurality of values representing the prices of congestion for the congestible transmission lines at a prospective time further comprises: determining a vector  $\lambda$  having values representing the prices of congestion for the congestible transmission lines at a prospective time  $T$ , wherein the vector  $\lambda$  contains one value of the price of electricity at a reference location and a value for the prices of congestion with respect to the reference location and each congestible transmission line; and

the step of determining a pattern of spot locational prices in the network at the prospective time further comprises: determining a matrix  $S$  representing a pattern of spot locational prices in the network at the prospective time  $T$ , wherein matrix  $S$  is determined by the formula:

$$S = A\lambda.$$